

Gisburn, Yorks. This specimen is also in the Manchester Museum, and the lower jaws have the usual six teeth.

Comparing a number of five-toothed jaws with a like number of six-toothed jaws, there seems to be a general tendency for all the teeth in the latter form to be somewhat smaller, as will be seen by the table on p. 294.

It might here be mentioned that there is nothing in the Glastonbury bones and lower jaws to indicate that more than the one species is present, viz. *Bos longifrons*.

Unfortunately in most finds the exact relation between the upper and lower teeth cannot usually be ascertained, owing to the scattered and imperfect condition of the remains. It might be of interest, therefore, to point out that the associated upper and lower jaws were found of the Haverbrack specimen, and these show the six teeth of the upper jaw exactly opposed to the five lower teeth; so that, if $\overline{\text{pm. 2}}$ were present, it would be quite functionless.

The whole feature of the loss of $\overline{\text{pm. 2}}$ in some oxen jaws seems to me to be a clear case of degeneration gradually brought about by disuse of that particular tooth.

Though the absence of $\overline{\text{pm. 2}}$ in ox jaws has been known for some time, the absence of this tooth from the jaws of sheep does not appear to have been noted hitherto. On sorting the sheep-remains from Glastonbury, however, I came across a fair percentage of lower jaws with only two premolars and three molars present in place of the usual six teeth.

This feature, as in the ox, may be likewise due to disuse, probably through change of food or habit under domestication.

As a further instance of $\overline{\text{pm. 2}}$ being missing, I might mention that both lower jaws of a specimen of *Capra ibex* in the Manchester Museum possess only five teeth.

XXIV.—*New Species of Heterocera from Dutch New Guinea.*

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[Plate XII.]

THE following species were all collected by Messrs. A. C. and F. Pratt in the Arfak Mountains, Dutch New Guinea, and the types are in the collection of Joicey. We are indebted to the Hon. W. Rothschild and Sir Geo. H. Kenrick for the opportunity afforded of comparing specimens in their collections.

Milionia rubrifascia, sp. n. (Pl. XII. fig. 1.)

Allied to *ventralis*, Roths., but at once distinguished by the much narrower band on the fore wing. This band narrows posteriorly and ends at vein 2. On the hind wing the blue basal area is much deeper in colour and has not the greenish reflection of *ventralis*.

Underside of fore wing with band paler and basal blue almost reaching it. Hind wing below with basal blue extending to end of cell and occupying same area as in *ventralis*.

Sexes similar.

Length of fore wing, ♂ ♀, 19 mm.

Types from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, Jan. to March 1914. A series.

Milionia rubra, sp. n. (Pl. XII. fig. 2.)

This species seems nearly allied to *ovata*, Roths., but differs especially in its much smaller size.

♀. *Upperside*.—Fore wing at extreme base, apical area, and outer margin black; rest of wing brick-red. This colour extends along costa to end of cell, then below subcostal to beyond origin of vein 7, and curving round to the inner margin. Base of costa yellow. Hind wing black shot with deep blue, which is much brighter at the base of cellules 2 and 3.

Underside.—Fore wing as above, red colour paler; a black and somewhat oblong patch at base below cell. Hind wing black; the extreme base in cellule 8 metallic blue, adjacent to which is a red spot, which does not touch costa. Head and collar metallic greenish blue; thorax and abdomen black, tinged with dark blue; legs black.

Length of fore wing 19 mm.

Type from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, March 1914. A series of 4 ♀ ♀ only.

Milionia xanthica, sp. n. (Pl. XII. fig. 3.)

♂. *Upperside*.—Fore wing black. An orange-yellow band 2 mm. broad, commencing at inner margin about two-thirds from base and extending into the cell between veins 2 and 3. Base of wing dark blue, shading into the ground-colour as far as the band. Hind wing with costa narrowly black; base black to near end of cell and shot with dark blue; distal area orange-yellow, a black marginal spot at extremity of vein 7, and three black dots at ends of veins 6, 4, and 3.

Underside like the upper. Band on fore wing wider and more clearly defined.

Head and thorax metallic blue above, blackish brown beneath; abdomen blackish brown and tinged with dark blue above.

♀ similar to ♂. Band on fore wing wider and more sharply defined. Basal blue brighter and suffusing the band. Hind wing without the three marginal dots, and below with only a faint dot on the end of vein 7, and costal black not reaching apex.

Length of fore wing, ♂ ♀, 21 mm.

Types from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea: ♂ Jan. to Feb. 1914, ♀ March 1914. A series of 2 ♂♂ and 13 ♀♀ from same locality, Jan. to March 1914.

The following three aberrational forms are contained in the series:—

Milionia xanthica, ab. *nigra*.

This form is represented by a single ♀, and differs in the complete absence of the band on the fore wing above. Below the band is wider than in the typical ♀, but may be much reduced, leading to the following form.

Milionia xanthica, ab. *bipuncta*. (Pl. XII. fig. 4.)

The band on the fore wing is here reduced to two ill-defined spots, one between veins 2 and 3 near their base and a larger one below it. These spots are better defined on the underside.

This specimen shows an increase of black at apex of hind wing, the spot on vein 7 being merged with the costal black.

Type (a ♀) the only specimen.

Milionia xanthica, ab. *extensa*. (Pl. XII. fig. 5.)

The band on the fore wing is much widened distally and extends to upper margin of cell. Its outer edge is ill-defined, and yellow scales are mixed with the ground-colour almost to outer margin, the yellowish tinge extending to vein 5; this is much better defined below. The yellow of the hind wing is more extended on both sides, so that the basal black does not reach beyond middle of cell, and its edge is irregularly defined.

Type (a ♀) the only specimen.

Transitions occur between the above forms. The only other ♂ in the series has the fore-wing band much narrowed and only extending to vein 2. In a ♀ it is still more reduced and only faintly indicated as far as the cell. Another ♀ has the band twice as wide as in the typical form.

Milionia knowlei, sp. n. (Pl. XII. fig. 6.)

♂. *Upperside*.—Fore wing black faintly shot with deep blue. Base metallic greenish blue, with a >-shaped indentation of the ground-colour. Hind wing with basal half to end of cell metallic greenish blue, distal half shot with deep blue.

Underside of fore wing black faintly shot with deep blue. Base metallic greenish blue, extending to near end of cell as far as vein 3. Hind wing black faintly shot with deep blue. At base a metallic greenish-blue costal streak, a similar streak along lower margin of cell on each side of median; a dark blue streak along inner margin. A subapical black patch of short hair or androconia, the hairs of which are directed outwardly.

Head, thorax, and abdomen metallic greenish blue; abdomen black below. Legs metallic greenish blue on outer side.

Sexes similar, ♀ without the hairy patch on hind wing below.

Length of fore wing, ♂ ♀, 22 mm.

Types from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, Jan. to Feb. 1914. A series of ♂ ♂ and 1 ♀.

This species seems nearly allied to *callima*, Roth. & Jord., and which has also the patch of modified scales on the hind wing below. Rothschild and Jordan, in the *Deutsch. Ent. Zeit.* 1907, pp. 194-5, describe a similar structure in *lamprima*, and note that in *euglennia*, a very similar-looking species, it is absent. Several other species of the genus exhibit the same characteristic.

Milionia weiskei rubidifascia, subsp. n. (Pl. XII. fig. 7.)

♂. Differs from *weiskei*, Roth., in the yellow band on fore wing being a little narrower and constricted between vein 2 and submedian. The apex is tipped with yellow, forming a spot. On the hind wing the red proximal bordering of the yellow band is much broader and widens posteriorly. The outer edge of the yellow band is incurved and rounded between veins 7 and 4, then convex to 2, and slightly incurved from thence to anal angle.

♀. Larger than ♂, and differing from *weiskei* ♀ in the red band on hind wing being distally widened and yellow band narrower between veins 4 and 6.

Length of fore wing, ♂ 23, ♀ 27 mm.

Types from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, Jan. to Feb. 1914. The only specimens.

Eubordeta albifascia, sp. n. (Pl. XII. fig. 8.)

♂. *Upperside*.—Fore wing black tinged with deep purplish blue. A narrow white band extends from costa across cell near its end, narrowing between veins 2 and 3 and ending a little below 2; distal edge of band dark glossy blue, as is also the basal half of wing. Hind wing ground-colour as in fore wing, basal half to end of cell a darker blue than on fore wing; costal margin brick-red, widening at the middle.

Underside of fore wing paler, a white band as above. A narrow yellow apical band, widest in the middle, extends from vein 7 to just below 4. Hind wing ground-colour paler than above; costa crimson at base, as is also a spot at base of costal vein; remainder of costa, limited by costal, orange-yellow; this streak joins a narrow marginal yellow band, irregularly shaped and reaching just below 3. A discal band, beginning below origin of vein 7, where it is white, to vein 5, and then yellow, crosses the cell near its end, fills the base of cellule 3, forms a square spot in 2 and a larger and proximally rounded spot in 1*b* and 1*c*.

Head, thorax, and abdomen blackish blue; three lateral crimson spots on abdomen.

Length of fore wing 22 mm.

Type from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, March 1914. A series of 6 ♂♂.

This species, in the markings of the hind wing below, recalls *E. rufoplagata*, Baker.

Craspedopsis angiana, sp. n. (Pl. XII. fig. 9.)

Above black, with a faint blue sheen at apex and outer margin of fore wing and over the dark distal part of hind wing. Both wings at base metallic greenish blue. On fore wing the basal blue extends to near middle of cell and to middle of inner margin, its distal edge straight and at right angles to costa. On hind wing the basal blue extends a little beyond cell, is limited by the costal, and reaches to near anal angle.

Underside of fore wing black, with a white band about 3 mm. wide, extending from subcostal across end of cell to

just beyond vein 2; base metallic greenish blue as far as the band. Hind wing below as above, but the blue extends farther and leaves a narrower distal margin than above.

Head, thorax, and abdomen dark blue.

Sexes similar, except that the ♂ bears on coxa of fore leg a thick fringe of white hair.

Length of fore wing, ♂ 17, ♀ 19 mm.

Types from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, March 1914. A series.

Buzara calodesma latimargo, subsp. n.

(Pl. XII. fig. 10.)

♀. Differs from *calodesma*, Roths., in the extended red at base of costa of fore wing nearly filling the basal two-thirds of cell, leaving only a narrow streak of black at its base. The yellow band is deeper in colour and nearly straight on its outer edge, and is widened proximally to just below origin of vein 2. At apex of wing the fringe only is yellow. On the hind wing the marginal band is about three times as wide as in *calodesma*, being 4 mm. broad. Below, the band on fore wing is broader than above.

Length of fore wing 29 mm.

Type a ♀ from Momi River, N. New Guinea, March 1914. The only specimen.

Parabasis felixi, sp. n. (Pl. XII. fig. 11.)

♂. Ground-colour of whole insect chrome-yellow, veins and other markings chestnut-brown.

Upperside.—Fore wing with only the costa, apical area, and outer margin for a breadth of 4 mm. of the ground-colour, the rest being creamy buff, limited distally by the first of four transverse lines; the first of these begins at a quarter of costa from apex, curves at vein 7, is straight to 4, and lunulate to inner margin at three-quarters from base; the second line parallel to first and much thicker, the third as thick and straighter, the space between it and second being twice the width between this and first line; the fourth line, faint on costa, is marked by a curve in middle of cell, a short bar, more proximal, below median of cell, and a straight line, more distal, from 1c to inner margin, where it joins the second line. Base of cell suffused with chestnut-brown, and a square spot of same colour below it near base. A thick line from base along inner margin and touching fourth line. Interspace between discocellular, third line, and vein 4 suffused with chestnut-brown; the third line joins the second

along vein 4. Outer margin with an irregular band from costa to vein 3, and separated from first discal line from costa to vein 6 by a yellowish line with black dots proximally of it on veins 6, 7, and 8. A submarginal row of seven black spots and a dot in cellule 8 at apex. Fringes dark at ends of veins. Hind wing without markings, except a black spot at anal angle and a small tuft of black hair below it.

Underside.—Fore wing chrome-yellow, darker beyond cell and over apical third; three black dots, the first the largest, in cellules 7, 6, and 5. Hind wing without markings.

Antennæ with black dot at base on vertex, prothorax, and patagia marked with chestnut-brown, the latter with fringe tipped with black; a small tuft of black hair at base of abdomen; tarsi black.

♀. Similar to ♂, with paler brownish markings and discal lines more heavily marked.

Length of fore wings, ♂ ♀, 27 mm.

Types from Angi Lakes, Arfak Mountains, 6000 feet, N. New Guinea, Jan. to Feb. 1914. 2 ♂♂ and 1 ♀ were obtained.

EXPLANATION OF PLATE XII.

- Fig. 1. *Milionia rubrifascia*, ♀.
Fig. 2. — *rubra*, ♀.
Fig. 3. — *xanثica*, ♀.
Fig. 4. — —, ab. *bipuncta*.
Fig. 5. — —, ab. *extensa*.
Fig. 6. — *knowlei*, ♂.
Fig. 7. — *weiskei rubidifascia*, ♂.
Fig. 8. *Eubordeta albifascia*, ♂.
Fig. 9. *Craspedopsis angiana*, ♂.
Fig. 10. *Buzara calodesma latimargo*, ♀.
Fig. 11. *Parabasis felixi*, ♂.

XXV.—Upper Silurian Foraminifera of Gothland.

By JOHN SMITH.

[Plate XIII.]

PREVIOUS KNOWLEDGE OF THE PALÆOZOIC FORAMINIFERA.

WE are pretty well acquainted with the Carboniferous Foraminifera, so well depicted in Brady's "Monograph," published by the Palæontographical Society in vol. xxx.

In strata lower than the Carboniferous few species have hitherto been found.